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Reedy Lake
Polk County, Florida

(U.S.) National Eutrophication Survey, Corvallis, OR

Prepared for

Corvallis Environmental Research Lab, OR

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT
ON
REEDY LAKE
POLK COUNTY
FLORIDA
EPA REGION IV
WORKING PAPER No. 272

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT
ON
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WITH THE COOPERATION OF THE

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

AND THE

FLORIDA NATIONAL GUARD

DECEMBER, 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Florida Department of Environmental Regulation for professional involvement and to the Florida National Guard for conducting the tributary sampling phase of the Survey.

Joseph W. Landers, Jr., Secretary of the Department of Environmental Regulation; John A Redmond, former Director of the Division of Planning, Technical Assistance, and Grants; and Dr. Tim S. Stuart, Chief of the Bureau of Water Quality, provided invaluable lake documentation and counsel during the survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

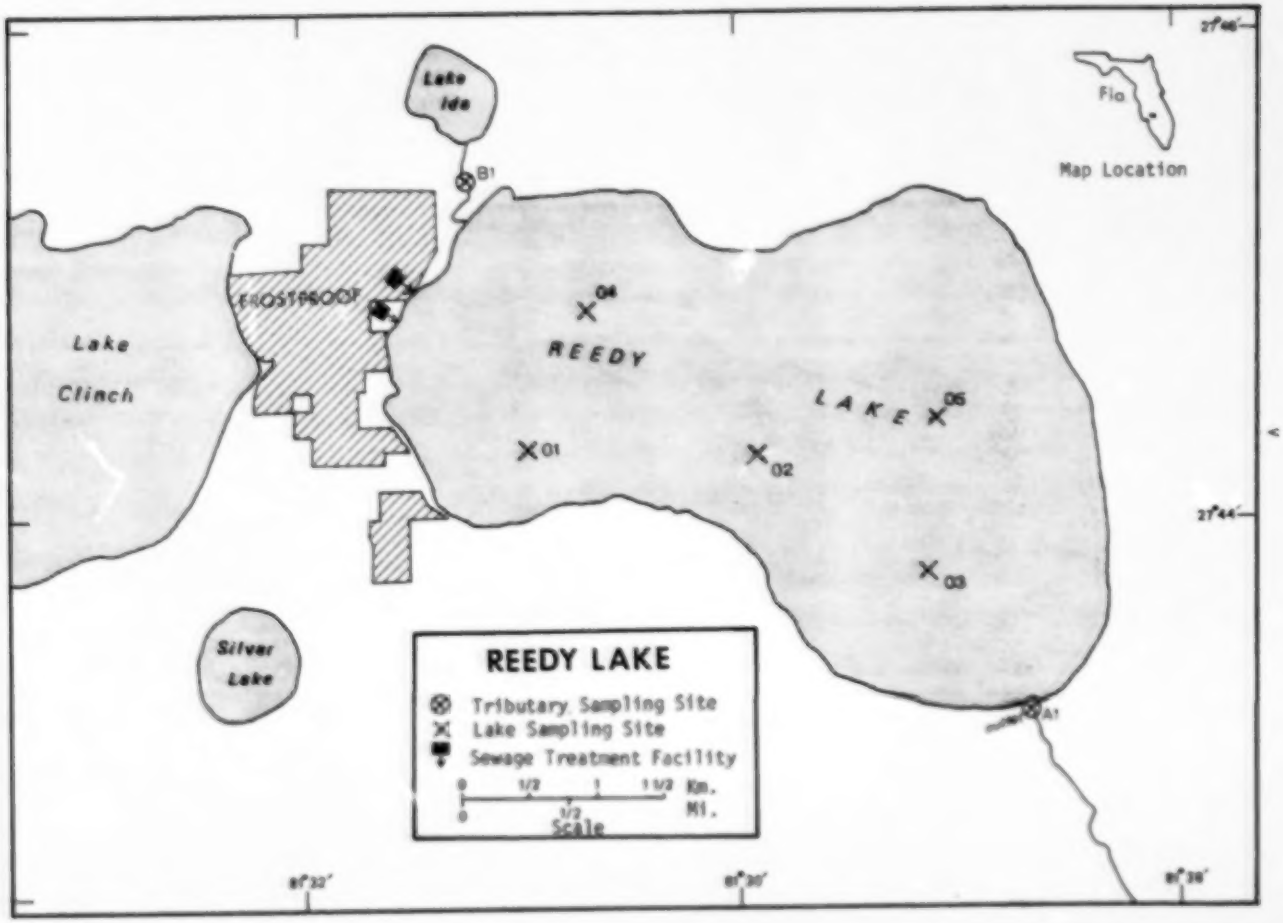
Major General Henry W. McMillan (Retired), then the Adjutant General of Florida, and Project Officer Colonel Hugo F. Windham, who directed the volunteer efforts of the Florida National Guard, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF FLORIDA

LAKE NAME	COUNTY
Alligator	Columbia
Apopka	Lake, Orange
Banana	Polk
Crescent	Flagler, Putnam
Doctors	Clay
Dora	Lake
East Tohopekaliga	Osceola
Effie	Polk
Eloise	Polk
George	Putnam, Volusia
Gibson	Polk
Glenada	Highlands
Griffin	Lake
Haines	Polk
Hancock	Polk
Horseshoe	Seminole
Howell	Orange, Seminole
Istokpoga	Highlands
Jessie	Polk
Jessup	Seminole
Kissimmee	Osceola
Lawne	Orange
Lulu	Polk
Marion	Polk
Minnehaha	Orange
Minneola	Lake
Monroe	Seminole, Volusia
Munson	Leon
Okeechobee	Glades, Hendry, Martin, Okeechobee, Palm Beach
Poinsett	Brevard, Orange, Osceola
Reedy	Polk
Seminole	Jackson, FL; Decatur, Seminole, GA
Seminole	Pinellas
South	Brevard
Talquin	Gadsden, Leon
Tarpon	Pinellas
Thonotosassa	Hillsborough
Tohopekaliga	Osceola
Trout	Lake
Weohyakapka	Polk
Yale	Lake


Lake Ida
B1
Fla
Map Location
FROSTPROOF
Lake
Clinch
REEDY
LAKE
04
05
01
02
03
Silver
Lake
A1
REEDY LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 1/2 1 1 1/2 Km.
0 1/2 Mi.
Scale
27°46'
27°44'
81°32'
81°30'
81°28'

REEDY LAKE

STORET NO. 1236

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Reedy Lake is eutrophic. It ranked eighteenth in overall trophic quality when the 41 Florida lakes sampled in 1973 were compared using a combination of six parameters*. Two lakes had less median total phosphorus, two had less median dissolved phosphorus, 35 had less median inorganic nitrogen, 22 had less mean chlorophyll a, and 18 had greater mean Secchi disc transparency. Depression of dissolved oxygen with depth occurred at station 2 in March.

Survey limnologists noted heavy algal blooms and rooted vegetation during sampling. High phytoplankton counts (see page 6) further indicate the trophic condition of this lake.

B. Rate-Limiting Nutrient:

The results of the algal assay indicate that primary productivity was limited by phosphorus at the time the sample was taken (03/12/73). The lake data indicate phosphorus limitation at all sampling stations and times, except for station 2 in November.

* See Appendix A.

C. Nutrient Controllability:

It is estimated that point sources contributed 4.5% of the total phosphorus input to Reedy Lake during the sampling year; and, based on estimates provided by the operator (page 9), the Ben Hill Griffin Co. citrus processing plant contributed 0.4% of the total load. However, Central Subdistrict personnel of the Florida Department of Environmental Regulation indicate the operator's estimates are too low by at least a factor of 10 and that the much-greater quantities of nutrients supplied by the plant in past years are still affecting the quality of the lake (Stuart, 1976). Therefore, it is probable that an assessment of nutrient controllability on the basis of the Survey data would be too conservative, and a need for a more-intensive study of the impact of point-source nutrients on Reedy Lake is indicated.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Morphometry††:

1. Surface area: 14.11 kilometers^2.
2. Mean depth: 3.3 meters.
3. Maximum depth: 4.3 meters.
4. Volume: 46.563 x 10^6 m^3.
5. Mean hydraulic retantion time: 1.5 years.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Unnamed Creek B-1	3.0	0.18
Minor tributaries & immediate drainage -	140.6	0.82
Totals	143.6	1.00

2. Outlet -

Reedy Creek	157.7**	1.00

C. Precipitation***:

1. Year of sampling: 150.9 centimeters.
2. Mean annual: 136.7 centimeters.

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† Table of metric conversions--Appendix B.
†† No bathymetric maps available. Surface area from FL Game & Fresh Water Fish Comm. (Anonymous, 1972); depths estimated from soundings reported in Appendix D.
* For limits of accuracy, see Working Paper No. 175, "... Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Reedy Lake was sampled three times in 1973 by means of a pontoon-equipped Huey helicopter. The first and third times, samples were collected from two or more depths at stations 1, 2, and 3 (see map, page v). The second time, samples were collected from two depths at sites 4 and 5. During each visit, a single depth-integrated (near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll *a* analysis. The maximum depths sampled were 2.4 meters at station 1, 3.0 meters at station 2, 2.1 meters at station 3, 3.0 meters at station 4, and 3.0 meters at station 5.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE REEDY
STORET CODE 1236

PARAMETER	1st Sampling (03/12/73) 3 Sites RANGE	MEAN	MEDIAN	2nd Sampling (09/05/73) 2 Sites RANGE	MEAN	MEDIAN	3rd Sampling (11/07/73) 3 Sites RANGE	MEAN	MEDIAN
TEMP (C)	22.3 - 27.8	24.8	24.6	28.2 - 28.6	28.5	28.5	23.3 - 23.8	23.5	23.5
DISS OXY (MG/L)	4.4 - 10.5	8.7	9.7	6.6 - 7.6	7.1	7.2	7.6 - 7.8	7.8	7.8
CNDCTVY (MCROMO)	220. - 245.	234.	235.	218. - 221.	220.	220.	191. - 193.	192.	192.
PH (STAND UNITS)	8.3 - 9.5	9.2	9.3	7.2 - 8.0	7.5	7.4	7.8 - 8.2	8.0	8.0
TOT ALK (MG/L)	47. - 64.	55.	57.	50. - 55.	53.	53.	44. - 48.	46.	46.
TOT P (MG/L)	0.021 - 0.059	0.045	0.044	0.020 - 0.045	0.030	0.028	0.027 - 0.032	0.029	0.029
ORTHO P (MG/L)	0.005 - 0.008	0.007	0.007	0.007 - 0.025	0.012	0.009	0.013 - 0.015	0.014	0.015
NO2+NO3 (MG/L)	0.200 - 0.340	0.286	0.300	0.140 - 0.170	0.157	0.160	0.070 - 0.100	0.085	0.080
AMMONIA (MG/L)	0.450 - 0.900	0.545	0.495	0.120 - 0.180	0.145	0.140	0.070 - 0.090	0.083	0.085
KJEL N (MG/L)	1.900 - 2.500	2.125	2.100	1.400 - 1.900	1.625	1.600	1.400 - 1.600	1.533	1.550
INORG N (MG/L)	0.750 - 1.100	0.831	0.790	0.260 - 0.350	0.302	0.300	0.140 - 0.190	0.168	0.165
TOTAL N (MG/L)	2.160 - 2.700	2.411	2.400	1.540 - 2.070	1.782	1.760	1.480 - 1.700	1.618	1.630
CHLRPYL A (UG/L)	20.8 - 33.1	29.0	33.0	50.3 - 53.2	51.7	51.7	28.5 - 31.2	29.4	28.6
SECCHI (METERS)	0.7 - 0.8	0.7	0.8	0.7 - 0.8	0.7	0.7	0.9 - 0.9	0.9	0.9

B. Biological characteristics:

1. Phytoplankton* -

Sampling Date	Dominant Genera	Algal Units per ml
09/05/73	1. Blue-green filaments	378,070
	2. Anabaena sp.	22,330
	3. Lyngbya sp.	19,827
	4. Navicula sp.	9,047
	5. Chroococcus sp.	1,540
	Other genera	4,232
	Total	435,046
11/07/73	1. Blue-green filaments	656,122
	2. Anabaena sp.	14,734
	3. Lyngbya sp.	14,215
	4. Aphanothece sp.	2,774
	5. Chroocuccus sp.	2,600
	Other genera	8,492
	Total	698,937

* The March phytoplankton sample was lost in shipment.

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
03/12/73	1	33.1
	2	33.0
	3	20.8
	4	-
	5	-
09/05/73	1	-
	2	-
	3	-
	4	53.2
	5	50.3
11/07/73	1	31.2
	2	28.5
	3	28.6
	4	-
	5	-

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.012	0.630	1.3
0.050 P	0.062	0.630	14.1
0.050 P + 1.0 N	0.062	1.630	21.7
1.0 N	0.012	1.630	1.6

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Reedy Lake was moderate at the time the sample was collected (03/12/73). Also, the increased yields with increased

levels of orthophosphorus indicate the lake was phosphorus limited at that time (note the lack of yield response when only nitrogen was added).

The lake data substantiate phosphorus limitation; i.e., the mean inorganic nitrogen to orthophosphorus ratios were 14 to 1 or greater at all sampling times, except for station 2 in November when the mean N/P ratio was 11/1 (probable nitrogen limitation).

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Florida National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v). Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Florida District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the nutrient loads, in $kg/km^2/yr$, at station B-1 and multiplying by the ZZ area in km^2.

The operator of the Frostproof wastewater treatment plant provided monthly effluent samples and corresponding flow data. The operator of the Ben Hill Griffin Company wastewater treatment plant did not participate, but he estimated nutrient discharges as 1,665 kg nitrogen and less than 40 kg phosphorus per seven-month operating season (these estimates may be too conservative--see page 2).

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* See Working Paper No. 175.

A. Waste Sources*:

1. Known municipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Frostproof	500	tr. filter	170.8	Reedy Lake

2. Known industrial -

Name	Type Waste	Treatment	Mean Flow (m^3/d)	Receiving Water
Ben Hill Griffin Co.	citrus process.	act. sludge	18,925	Reedy Lake

* Treatment plant questionnaires.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Unnamed Creek B-1	170	1.8
b. Minor tributaries & immediate drainage (non-point load) -	8,015	87.0
c. Known municipal STP's -		
Frostproof	360	3.9
d. Septic tanks* -	15	0.2
e. Known industrial -		
Ben Hill Griffin Co.	40(?)	0.4
f. Direct precipitation** -	620	6.7
Total	9,240	100.0

2. Outputs -

Lake outlet - Reedy Creek 1,010

3. Net annual P accumulation - 8,230 kg.

* Estimate based on 58 lakeshore dwellings; see Working Paper No. 175.
** Brezonik and Shannon, 1971.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Unnamed Creek B-1	22,000	2.1
b. Minor tributaries & immediate drainage (non-point load) -	1,031,020	96.8
c. Known municipal STP's -		
Frostproof	875	0.1
d. Septic tanks* -	620	0.1
e. Known industrial -		
Ben Hill Griffin Co.	1,665(?)	0.1
f. Direct precipitation** -	8,185	0.8
Totals	1,066,300	100.0

2. Outputs -

Lake outlet - Reedy Creek 45,680

3. Net annual N accumulation - 1,020,620 kg.

* Estimate based on 58 lakeshore dwellings; see Working Paper No. 175.
** Brezonik and Shannon, 1971.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Unnamed Creek B-1	57	7,333

E. Yearly Loads:

In the following table, the Survey phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Note, however, the Florida lakes may assimilate phosphorus at a somewhat higher level than that suggested by Vollenweider (Shannon and Brezonik, 1972).

Essentially, Vollenweider's "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	0.65	0.58	75.6	72.3

Vollenweider phosphorus loadings (g/m^2/yr) based on estimated mean depth and hydraulic retention time of Reedy Lake:

"Dangerous" (eutrophic loading)	0.30
"Permissible (oligotrophic loading)	0.15

V. LITERATURE REVIEWED

Anonymous, 1972. 1971-1972 Annual Progress Report-water quality investigations. Fed. Aid in Fish Restor., Dingell-Johnson Proj. F-21-6, FL Game & Fresh Water Fish Comm., Tallahassee.

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Vollenweider, R.A., and P.J. Dillon, 1974. The application of the phosphorus loaidng concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

Land data to be used in estimates

Land Code	Land name	[illegible] Total [illegible]	[illegible] Income [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] Dist [illegible]
1201	Alligator Land	0.025	0.700	470.000	87.733	13.100	0.190
1202	Land Aquona	0.197	0.730	940.175	95.611	0.200	0.019
1203	Land Gonana	0.065	0.700	402.667	70.000	3.000	0.293
1204	Land Cheltenf	0.045	0.130	673.000	10.231	10.204	0.033
1207	Ductons Land	0.090	0.120	605.555	27.100	10.000	0.029
1208	Land Dipa	0.197	0.200	402.000	50.970	7.000	0.022
1209	Land Eppie	1.003	0.010	980.000	201.033	15.000	0.950
1210	Land Hidge	0.129	0.105	900.388	35.000	11.000	0.063
1211	Land Dixon	0.197	0.115	470.000	19.675	10.200	0.009
1212	Glenoda Land	0.136	0.105	950.197	27.007	10.700	0.072
1214	Land Griffin	0.119	0.700	401.333	60.855	0.000	0.030
1215	Land Hardy	0.063	0.115	902.007	20.567	10.000	0.014
1217	Land Hancock	0.777	0.195	403.000	97.900	5.000	0.150
1219	Land Kimble	0.034	0.130	950.003	12.007	11.500	0.003
1220	Land Hoffa	1.206	0.205	900.000	54.117	9.000	1.175
1221	Land Johnson	0.033	0.120	900.222	0.500	0.000	0.010
1223	Land Bisby	0.497	0.705	407.000	70.550	7.000	0.200
1226	Land Bissimon	0.034	0.105	903.007	20.102	0.000	0.007
1227	Land Lulu	1.090	1.005	403.600	270.500	10.300	1.030
1228	Land Martin	0.800	0.200	900.031	29.907	7.000	0.015
1229	Land Minnehaha	0.030	0.090	910.000	0.733	7.700	0.012
1230	Land Minnelula	0.010	0.075	900.333	0.333	7.000	0.009
1231	Land Monroe	0.100	0.100	970.555	10.275	10.000	0.125
1232	Land Sheecmoore	0.063	0.105	972.300	10.525	9.000	0.010
1234	Land [illegible]	0.200	0.150	900.000	0.500	10.000	0.021
1236	Land [illegible]	0.031	0.330	900.000	10.037	10.000	0.000
1238	Land South	0.617	0.130	900.000	77.107	9.000	0.020
1239	Land Talbuth	0.000	0.200	902.107	0.000	10.000	0.021

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	SOD-MEAN SEC	MEAN CHLORA	IS-MIN DO	MEDIAN DISS ORTHO P
1240	LAKE THONOTOSASSA	0.095	0.095	466.167	37.700	10.200	0.565
1241	LAKE TOHOPEKALIGA	0.240	0.200	472.917	30.033	10.500	0.152
1242	TROUT LAKE	1.110	0.650	472.000	76.967	12.900	0.470
1243	LAKE HEONYAKAPKA	0.047	0.080	458.667	7.767	8.200	0.011
1246	LAKE YALE	0.027	0.160	441.000	25.367	7.600	0.014
1247	LAKE MUNSON	1.475	0.925	486.667	140.317	12.200	0.892
1248	LAKE SEMINOLE	0.234	0.175	473.833	102.000	6.600	0.020
1249	LAKE LAWNE	2.560	1.350	494.667	64.900	10.400	0.117
1250	LAKE TARPON	0.041	0.070	480.884	6.867	9.000	0.027
1252	LAKE ELOISE	0.486	0.170	465.333	78.233	12.200	0.339
1258	LAKE JESSIE	0.051	0.030	452.667	26.300	10.000	0.011
1261	EAST LAKE TOHOPEKALIGA	0.042	0.070	440.833	5.167	9.400	0.007
1264	PAYNE'S PRAIRIE LAKE INO	1.260	0.140	470.000	88.200	7.400	1.210

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1201	ALLIGATOR LAKE	25 (10)	29 (10)	30 (12)	18 (7)	10 (4)	18 (7)	130
1202	LAKE APOPKA	50 (20)	38 (15)	10 (4)	38 (15)	74 (29)	70 (28)	280
1203	LAKE BANANA	23 (9)	29 (10)	20 (8)	5 (2)	100 (40)	23 (9)	200
1206	LAKE CRESCENT	65 (26)	70 (27)	33 (13)	80 (32)	48 (18)	50 (20)	346
1207	DOCTORS LAKE	60 (24)	76 (30)	60 (24)	55 (22)	34 (12)	56 (22)	341
1208	LAKE DORA	53 (21)	35 (14)	18 (7)	33 (13)	90 (35)	68 (27)	297
1209	LAKE EFFIE	5 (2)	10 (4)	3 (1)	3 (1)	0 (0)	10 (4)	31
1210	LAKE GEORGE	45 (18)	54 (21)	48 (19)	43 (17)	23 (9)	43 (17)	256
1211	LAKE GIBSON	40 (16)	81 (32)	45 (18)	70 (28)	48 (18)	40 (16)	324
1212	GLENADA LAKE	43 (17)	54 (21)	85 (34)	53 (21)	3 (1)	38 (15)	276
1214	LAKE GRIFFIN	48 (19)	29 (10)	23 (9)	30 (12)	95 (38)	48 (19)	273
1215	LAKE HAINES	70 (28)	81 (32)	75 (30)	58 (23)	34 (12)	78 (31)	396
1217	LAKE HANCOCK	18 (7)	43 (17)	13 (5)	13 (5)	98 (39)	28 (11)	213
1219	LAKE HORSESHOE	93 (37)	70 (27)	80 (32)	78 (31)	20 (8)	65 (26)	406
1220	LAKE HOWELL	11 (4)	23 (9)	69 (27)	35 (14)	60 (23)	3 (1)	201
1221	LAKE ISTOKPOGA	85 (34)	76 (30)	65 (26)	93 (37)	69 (27)	89 (35)	477
1223	LAKE JESSUP	28 (11)	18 (7)	5 (2)	25 (10)	83 (32)	25 (10)	184
1224	LAKE KISSIMMEE	90 (36)	63 (25)	73 (29)	65 (26)	65 (26)	99 (39)	455
1227	LAKE LULU	3 (1)	3 (1)	15 (6)	0 (0)	8 (3)	5 (2)	34
1228	LAKE MARION	78 (31)	29 (10)	53 (21)	50 (20)	83 (32)	73 (29)	366
1229	LAKE MINNEHAHA	88 (35)	91 (36)	95 (38)	85 (34)	78 (31)	80 (32)	517
1230	LAKE MINNEOLA	100 (40)	98 (38)	98 (39)	100 (40)	90 (35)	93 (37)	579
1231	LAKE MONROE	38 (15)	15 (6)	28 (11)	75 (30)	26 (10)	33 (13)	215
1232	LAKE OKEECHOBEE	68 (27)	45 (18)	40 (16)	73 (29)	53 (21)	89 (35)	368
1234	LAKE POINSETT	58 (23)	60 (24)	50 (20)	95 (38)	34 (12)	45 (18)	342
1236	LAKE REEDY	95 (38)	13 (5)	55 (22)	45 (18)	34 (12)	95 (38)	337
1238	LAKE SOUTH	63 (25)	70 (27)	69 (27)	68 (27)	60 (23)	56 (22)	386
1239	LAKE TALQUIN	55 (22)	20 (8)	78 (31)	83 (33)	5 (2)	53 (21)	294

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLOPA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1240	LAKE THONOTOSASSA	20 (8)	85 (34)	58 (23)	40 (16)	48 (18)	15 (6)	266
1241	LAKE TOHOPEKALIGA	33 (13)	40 (16)	38 (15)	48 (19)	40 (16)	30 (12)	229
1242	TROUT LAKE	15 (6)	8 (3)	43 (17)	23 (9)	13 (5)	8 (3)	110
1243	LAKE WEOHYAKAPKA	75 (30)	91 (36)	83 (33)	88 (35)	74 (29)	84 (33)	495
1246	LAKE YALE	98 (39)	58 (23)	90 (36)	63 (25)	83 (32)	75 (30)	467
1247	LAKE MUNSON	8 (3)	5 (2)	8 (3)	8 (3)	16 (6)	13 (5)	58
1248	LAKE SEMINOLE	35 (14)	48 (19)	35 (14)	10 (4)	69 (27)	63 (25)	260
1249	LAKE LAWNE	0 (0)	0 (0)	0 (0)	20 (8)	43 (17)	35 (14)	98
1250	LAKE TARPON	83 (33)	98 (38)	100 (40)	90 (36)	60 (23)	60 (24)	491
1252	LAKE ELOISE	30 (12)	50 (20)	63 (25)	28 (11)	16 (6)	20 (8)	207
1258	LAKE JESSIE	73 (29)	88 (35)	86 (35)	60 (24)	26 (10)	84 (33)	419
1261	EAST LAKE TOHOPEKALIGA	80 (32)	98 (38)	93 (37)	98 (39)	55 (22)	99 (39)	523
1264	PAYNE'S PRAIRIE LAKE (NO	11 (4)	65 (26)	25 (10)	15 (6)	90 (35)	0 (0)	206

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1230	LAKE MINNEOLA	579
2	1261	EAST LAKE TOHOPEKALIGA	523
3	1229	LAKE MINNEHAHA	517
4	1243	LAKE WEOHYAKAPKA	495
5	1250	LAKE TARPON	491
6	1221	LAKE ISTOKPOGA	477
7	1246	LAKE YALE	467
8	1224	LAKE KISSIMMEE	455
9	1258	LAKE JESSIE	419
10	1219	LAKE HORSESHOE	406
11	1215	LAKE HAINES	396
12	1238	LAKE SOUTH	386
13	1232	LAKE OKEECHOBEE	368
14	1228	LAKE MARION	366
15	1206	LAKE CRESCENT	346
16	1234	LAKE POINSETT	342
17	1207	DOCTORS LAKE	341
18	1236	LAKE REEDY	337
19	1211	LAKE GIBSON	324
20	1208	LAKE DORA	297
21	1239	LAKE TALQUIN	294
22	1202	LAKE APOPKA	280
23	1212	GLENADA LAKE	276
24	1214	LAKE GRIFFIN	273
25	1240	LAKE THONOTOSASSA	266
26	1248	LAKE SEMINOLE	260
27	1210	LAKE GEORGE	256
28	1241	LAKE TOHOPEKALIGA	229

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	1231	LAKE MONROE	215
30	1217	LAKE HANCOCK	213
31	1252	LAKE ELOISE	207
32	1264	PAYNE'S PRAIRIE LAKE (NO	206
33	1220	LAKE HOWELL	201
34	1203	LAKE BANANA	200
35	1223	LAKE JESSUP	184
36	1201	ALLIGATOR LAKE	130
37	1242	TROUT LAKE	110
38	1249	LAKE LAWNE	98
39	1247	LAKE MUNSON	58
40	1227	LAKE LULU	34
41	1209	LAKE EFFIE	31

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 - cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR FLORIDA 8/25/75

LAKE CODE 1236 REEDY LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 157.7

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1236A1	157.7	0.92	0.89	0.87	0.78	0.56	0.75	0.98	1.12	1.31	1.54	1.24	1.03	1.00
1236B1	3.0	0.18	0.18	0.18	0.18	0.16	0.17	0.18	0.19	0.20	0.21	0.19	0.18	0.18
1236ZZ	140.9	0.73	0.82	0.64	0.59	0.64	0.97	0.75	1.01	1.17	1.03	0.77	0.68	0.82

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 157.7
SUM OF SUB-DRAINAGE AREAS = 143.8

TOTAL FLOW IN = 11.99
TOTAL FLOW OUT = 12.01

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1236A1	3	73	0.65	18	0.62				
	4	73	0.68	13	0.74				
	5	73	0.54	17	0.57				
	6	73	0.51	14	0.45				
	7	73	0.65	13	0.74				
	8	73	0.85	17	0.82				
	9	73	1.10	14	1.16				
	10	73	1.10	12	1.19				
	11	73	0.88	16	0.88				
	12	73	0.74	14	0.68				
	1	74	0.62	17	0.62				
	2	74	0.48	14	0.48				
1236B1	3	73	0.18	18	0.18				
	4	73	0.19	13	0.19				
	5	73	0.18	17	0.18				
	6	73	0.17	14	0.17				
	7	73	0.18	13	0.18				
	8	73	0.19	17	0.19				
	9	73	0.21	14	0.21				
	10	73	0.20	12	0.21				
	11	73	0.19	16	0.19				
	12	73	0.18	14	0.18				
	1	74	0.18	17	0.18				
	2	74	0.18	14	0.18				
1236ZZ	3	73	0.48	18	0.45				
	4	73	0.51	13	0.57				
	5	73	0.34	17	0.40				
	6	73	0.34	14	0.28				
	7	73	0.48	13	0.54				
	8	73	0.65	17	0.62				
	9	73	0.88	14	0.93				
	10	73	0.91	12	0.99				
	11	73	0.68	16	0.68				
	12	73	0.54	14	0.51				
	1	74	0.45	17	0.42				
	2	74	0.31	14	0.31				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/08/25

123601
27 44 20.0 081 31 01.0
LAKE REEDY
12105 FLORIDA

11EPALES
3

2111202
0010 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	14	15 0000	26.1		30	240	9.40	47	0.490	2.300	0.340	0.008
	14	15 0005	24.6	10.5		235	9.40	48	0.500	1.900	0.330	0.007
	14	15 0008	24.7	10.1		235	9.30	49	0.480	2.100	0.300	0.007
73/11/07	10	10 0000	23.4		36	192	8.20	44	0.090	1.600	0.100	0.015
	10	10 0001	23.4	7.8		192						
	10	10 0007	23.3	7.8		191	7.80	45	0.090	1.600	0.100	0.013

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	14	15 0000	0.047	33.1
	14	15 0005	0.039	
	14	15 0008	0.021	
73/11/07	10	10 0000	0.032	31.2
	10	10 0007	0.031	

STORET RETRIEVAL DATE 75/08/25

123502
27 44 32.0 081 29 58.0
LAKE REEDY
12105 FLORIDA

11EPALES
3

2111202
0014 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	14 50	0000						57	0.450	2.200	0.300	0.008
	14 50	0004						58	0.540	2.000	0.260	0.005
	14 50	0010						64	0.900	2.500	0.200	0.007
73/03/13	14 50	0000	27.8		28	240	9.50					
	14 50	0004	23.7	8.9		230	8.80					
	14 50	0010	22.3	4.4		245	8.30					
73/11/07	10 23	0000	23.5		36	192	7.90	46	0.080	1.600	0.080	0.015
	10 23	0001	23.5	7.8		192						
	10 23	0008	23.5	7.8		191	8.00	46	0.070	1.500	0.070	0.015
	10 37	0000						47	0.080	1.400	0.080	0.015
	10 37	0007						48	0.090	1.500	0.080	0.013

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	14 50	0000	0.059	
	14 50	0004	0.053	
	14 50	0010	0.059	
73/03/13	14 50	0000		33.0
73/11/07	10 23	0000	0.026	28.5
	10 23	0008	0.027	
	10 37	0000	0.028	
	10 37	0007	0.030	

STORET RETRIEVAL DATE 75/08/25

123603
27 43 43.0 081 29 08.0
LAKE REEDY
12105 FLORIDA

11EPALES
3

2111202
0010 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/13	16 00	0000	25.5		30	230	9.50	58	0.480	2.100	0.300	0.008
	16 00	0004	24.0	9.7		220	9.30	57	0.520	1.900	0.260	0.008
73/11/07	10 37	0000	23.8		36	193	8.20					
	10 37	0001	23.8	7.6		193						
	10 37	0007	23.7	7.8		192	8.00					

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/13	16 00	0000	0.040	20.8
	16 00	0004	0.042	
73/11/07	10 37	0000		28.6

STORET RETRIEVAL DATE 75/08/25

123004
24 44 45.0 081 30 40.0
LAKE REEDY
12105 FLORIDA

11EPALES
4

2111202
0012 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/09/05	13 00	0000	28.6	7.2	30	221	8.00	51	0.180	1.900	0.170	0.025
	13 00	0010	28.5	7.6		218	7.40	50	0.130	1.500	0.160	0.010

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/09/05	13 00	0000	0.034	53.2
	13 00	0010	0.045	

STORET RETRIEVAL DATE 75/08/25

123605
24 44 30.0 081 29 15.0
LAKE REEDY
12105 FLORIDA

11EPALES
4

2111202
0013 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/09/05	13 30	0000	0.022	50.3
	13 30	0010	0.020	

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/09/05	13 30	0000	28.6		26	221	7.50	55	0.150	1.700	0.160	0.008
	13 30	0010	28.2	6.6		219	7.20	55	0.120	1.400	0.140	0.007

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/08/25

1236A1
27 43 00.0 081 28 30.0
REEDY CREEK
12009 7.5 LK ARBUCKLE
O/REEDY CREEK
RD BRDG NEAR GAGING STATION
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/18	14 25		0.140	1.700	0.399	0.015	0.060
73/04/13	10 55		0.084	2.300	0.260	0.008	0.045
73/05/17	10 40		0.052	2.300	0.140	0.007	0.055
73/06/14	10 35		0.010K	1.100	0.009	0.007	0.025
73/07/13	09 55		0.011	1.320	0.036	0.008	0.030
73/08/17	10 40		0.010K	1.180	0.016	0.009	0.020
73/09/14	10 30		0.010K	1.050	0.026	0.007	0.030
73/10/12	10 45		0.010K	1.350	0.012	0.007	0.020
73/11/16	11 05		0.024	0.800	0.008	0.008	0.010
73/12/14	12 40		0.016	0.900	0.012	0.012	0.025
74/01/17	12 30		0.016	1.200	0.008	0.008	0.030
74/02/14	12 50		0.008	1.600	0.010	0.005K	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/08/25

123681
27 46 00.0 081 31 30.0
UNNAMED CREEK
12 7.5 BABSON PARK
I/REEDY LAKE
ST HWY 630 BRDG OUTLET OF LAKE IDA
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/18	14	50	3.200	0.880	0.072	0.010	0.035
73/04/13	11	15	2.100	0.980	0.029	0.006	0.030
73/05/17	11	20	1.900	2.900	0.310	0.007	0.035
73/06/14	11	20	1.940	1.700	0.135	0.007	0.030
73/07/13	10	05	1.880	1.100	0.138	0.007	0.035
73/08/17	11	25	1.800	0.930	0.056	0.020	0.040
73/09/14	10	45	1.900	0.980	0.075	0.005K	0.030
73/10/12	11	30	2.600	1.200	0.036	0.009	0.025
73/11/16	11	45	3.080	0.800	0.020	0.008	0.025
73/12/14	12	55	3.780	0.200	0.024	0.012	0.012
74/01/17	13	10	4.300	0.900	0.032		0.026
74/02/14	13	30	3.600	1.200	0.020	0.005K	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/08/25

1236DA TF1232CA P000500
27 45 00.0 080 31 30.0
FROSTPROOF
12009 1-250000 FT PIER
D/LAKE REEDY
LAKE REEDY
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/03/06	11 00		1.790	17.000	6.720	5.500	9.100	0.035	0.033
73/03/26	16 00		2.000	19.000	6.550	8.700	8.900	0.045	0.045
73/05/01	15 00		2.200	9.540	1.502	3.000	3.600	0.044	0.048
73/06/04	14 00		1.670	11.500	2.940	6.380	7.100	0.032	0.042
73/06/28	22 00		1.975	9.050	1.940	5.650	6.600	0.031	0.032
73/07/30	08 00		2.940	7.200	2.400	4.300	5.200	0.046	0.049
73/08/30	12 00		3.500	3.900		2.620	3.900	0.060	0.061
73/10/05	15 00		2.520	8.200	0.570	2.800	3.950	0.070	0.025
73/11/02	21 00		4.800	18.000	4.300	6.900	8.400	0.065	0.064
73/12/05	12 30		1.680	10.500	2.400	3.700	5.000	0.050	0.048
74/01/07	09 00		2.400	10.500	4.200	3.520	3.700	0.037	0.050
74/02/12	11 00		3.000	14.000	3.680	4.100	4.950	0.046	0.045